UNIVERSITY OF CALIFORNIA
COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION
BERKELEY, CALIFORNIA

SERIES ON CALIFORNIA CROPS AND PRICES

# WHEAT

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BULLETIN 502
November, 1930

CONTRIBUTION FROM THE
GIANNINI FOUNDATION OF AGRICULTURAL ECONOMICS

UNIVERSITY OF CALIFORNIA PRINTING OFFICE
BERKELEY, CALIFORNIA

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# WHEAT[1]

E. W. BRAUN[2]


## SUMMARY

The California wheat industry is directly affected by the world wheat situation. At one time California exported large amounts of wheat so that the price of wheat at San Francisco was on an export-price basis. Now California imports wheat in quantity, thus placing the San Francisco price on an import-price basis.

In 1890 California was the second largest wheat-producing state in the Union, with an average production of about 40 million bushels. Shortly thereafter, production began to decline and continued downward until 1913 when it reached a low point of 4.2 million bushels. Since then the trend has been upward; during the past five years production has averaged 13.5 million bushels annually.

The present production, however, supplies less than one-half of the wheat requirements of this state. During the four-year period 1926–1929, California imported an average of 16.2 million bushels annually in the form of grain and flour. The Pacific Northwest is the principal source of these import supplies, furnishing 50 per cent of the total. The Idaho region furnishes 37 per cent and is gaining in importance. The remaining 13 per cent comes from other states.

California is the nearest market for Pacific Northwest export wheat and flour. Approximately 20 per cent of the flour exports from the Pacific Northwest come to California. Other United States ports and the Orient offer an outlet for 26 per cent and 31 per cent, respectively. With wheat as grain the situation is somewhat different. California takes 1.5 million bushels, and approximately 26 million bushels, is shipped to Europe. The remainder goes to other countries, principally Japan. In Europe, particularly in Great Britain, it comes in direct competition with wheat from many parts of the world. Australian wheat is the same in nature as that of the Pacific Coast. The two are therefore direct competitors.


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The price of wheat at San Francisco has followed a widely fluctuating course during the past twenty years. The average price for the five years just preceding the war was $1.62 a hundred. During the war when prices in general were high, the price of wheat rose to $3.67; it fell precipitously in 1920–21 and 1921–22 to $2.04 a hundred. In 1924–25 it again went very high, averaging $2.90 a hundred for the season. Since that time it has, except for minor rises, fallen steadily. The average for the last five years is $2.31 a hundred; the average for the last two years is $2.11 a hundred.

There is a tendency for California wheat prices to fluctuate with wheat prices in eastern markets. This is due in part to the fact that all primary markets have a tendency to move in the same direction and in part to the fact that Idaho shipments are directed eastward as well as westward. Also, California draws some wheat from as far east as the Mississippi Valley. This price relation is not as close, however, as the relation between the San Francisco price and the Portland price, which in turn is closely related to the price at English markets.

Variations in the price of wheat from year to year at San Francisco are closely related to the year-to-year price changes at Portland, and to those in Liverpool and London. This is due to the fact that the Pacific Northwest ships wheat and flour to California and to Europe throughout the year. The price of California wheat at San Francisco tends to be above the Portland price by the amount of the expenses incurred in bringing wheat from Portland to California. During the nine years 1921–1929 Liverpool and London prices averaged 16 cents a bushel above San Francisco, which in turn was 10 cents a bushel above the price at Portland.

Because Great Britain imports more wheat than any other country and draws it from many parts of the world, the most representative world wheat price is that established at Liverpool and London. The world wheat price movement from one season to another is affected principally by four factors: first, the volume of production in the principal exporting areas; second, the size of the European crop; third, the carryover of wheat in exporting countries and in Great Britain; fourth, changes in the buying power of consumers. It must be remembered, however, that these factors do not exert an equal influence on the price of wheat, nor do the same ones operate in the same direction each year.

The future trend of wheat production in Canada, United States, Argentina, and Australia—the principal wheat-exporting countries—

and also Russia, will have an important bearing upon the world level of wheat prices. During the past twenty years the most significant expansion has taken place in Canada and Argentina, the average annual increase being 15 million and 5.5 million bushels, respectively. There is no apparent change in these trends. Since the World War, the most significant expansion has taken place in Europe. This increase in Europe has been in the nature of a recovery from the decline in production which occurred during the war. Russia, however, appears to be the potential source of a large supply. If large-scale farming operations now being carried out by the Russian government prove successful, it is likely that Russia will soon be an important factor in international trade in wheat.

The combined harvester, which greatly reduces the cost of harvesting, is coming into extensive use and is a stimulus to increased wheat acreage, particularly in those areas which are now not profitable for growing wheat but which may be made profitable by the use of modern machinery.

During the immediate future the trend of wheat production in Europe with its consequent effect upon the world wheat price, will very largely determine the price that may be expected for California wheat. The year-to-year outlook for California will be given in annual outlook reports.

## THE POSITION OF CALIFORNIA AS A WHEAT-PRODUCING STATE

*California Acreage, Yields, and Production.*—California was at one time one of the principal wheat-producing states in the Union. The United States Census of 1890 attributed to California 41 million bushels, which was 9 per cent of the total United States crop of 468 million bushels. This was exceeded only by Minnesota, which had a production amounting to 11 per cent of the total.

The prominence of California as a wheat-producing state began with the gold rush of 1849. By 1878 a production of over 40 million bushels was attained. This high level was maintained for twenty years, 1878–1897, during which time the annual average production was 35,609,000 bushels. After 1897 production declined materially and steadily until 1913, in which year the production was only 4,200,000 bushels. This decline in production was due entirely to a decline in acreage because yields for the state as a whole remained at an average of 12.5 bushels from 1880 to 1910. Much of the wheat land gave way to barley. California barley brought high premiums in England because of its exceptional malting qualities.

Since 1913 wheat acreage and production in California have increased as shown in figure 1. The average production during the four years 1926–29 was 13,569,000 bushels. The increase has been due in part to the fact that the yield per acre for the state is now averaging 18.0 bushels, which is 5.0 bushels above the average prior to 1910. Harvested acreage has increased from a 1910–1914 average of 420,000 acres to a 1925–1929 average of 705,000 acres, an increase of 285,000 acres.

*Distribution of Wheat Acreage in California.*—Wheat is grown commercially in many sections of the state. Eleven counties in the Sacramento Valley, including San Joaquin County, comprise the principal continuous wheat section in the state. In 1924, 59 per cent of the harvested wheat acreage in the state was in this section.[3] The remaining 41 per cent was very widely distributed. The 1930 census on crop distribution will, when it appears, not only be more recent than the 1925 census, but will also be a much better basis from which to get the distribution of acreage, because according to reports of the United States Weather Bureau rainfall for California was 13 inches below normal during the season of July, 1923, to June, 1924. As a result the 1924 crop was so poor that less than 50 per cent of the seeded acreage was harvested.

[3] 1925 United States Census of Agriculture.

*Type of wheat Grown in California and Other Western States.*—Practically all of the wheat grown in California and the other wheat-producing states west of the Rocky Mountains is of the type known as common white wheat.[4] This is due to the nature of the climate in this

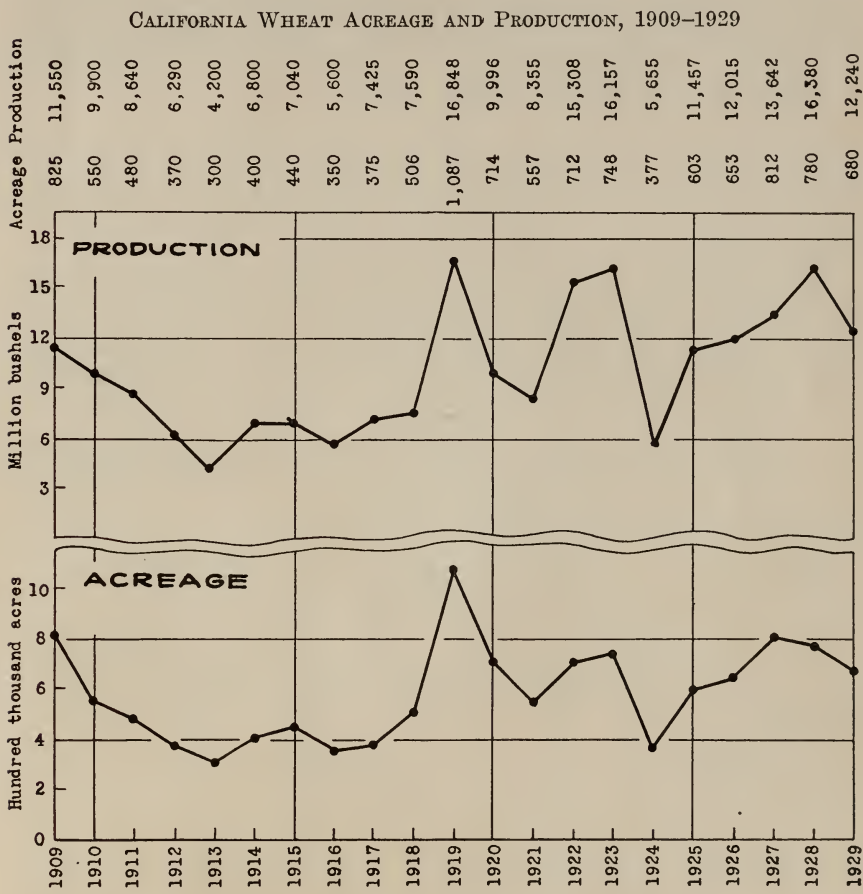


Fig. 1.—California wheat production reached a low point of 4,200,000 bushels in 1913. Production during the four years, 1926–1929, has averaged 13,570,000 bushels.

Data from table 10.

section. Washington, Oregon, California, and Idaho are the principal white-wheat-producing states. The most important varieties grown in these states are Pacific Bluestem, Baart, Bunyip, Hard Federation, and Federation. Sonora, a special variety, is particularly adapted

[4] An excellent discussion of the distribution and description of the varieties included in this type of wheat is given in: Clark, J. A., *et al.* The common white wheats. U. S. Dept. Agr., Farmers' Bul. **1301**:1–41. 1922.

to the Tulare Lake region. Flour from Sonora wheat is not desirable for bread making. It is used principally in the manufacture of crackers, pastries, and breakfast foods. The soft white varieties are rather generally used in the making of pastry flour. In the milling of bread flour the hard white varieties are blended with red wheat to improve the quality of the gluten content. The red wheats frequently do not have a higher gluten content than do the white varieties, but the gluten is generally of a better quality.

## WHEAT AND FLOUR BROUGHT INTO CALIFORNIA BY REGIONS OF ORIGIN

California does not produce enough wheat to supply her own requirements. The Pacific Northwest and Idaho, as is shown in table 1, are the outside sources most heavily drawn upon. During the four-year period 1926–1929, an average of 2,469,000 barrels of flour and

TABLE 1

WHEAT AND FLOUR BROUGHT INTO CALIFORNIA BY REGIONS OF ORIGIN, AVERAGE 1926–1929*

| Region of origin† | Flour | Flour in wheat equivalent | Wheat as grain | Wheat and flour in terms of wheat | Per cent |
|---|---|---|---|---|---|
| | *1* | *2* | *3* | *4* | *5* |
| | *1,000 bbls.* | *1,000 bu.* | *1,000 bu.* | *1,000 bu.* | |
| 1. Pacific Northwest | 1,538 | 6,903 | 1,142 | 8,045 | 50 |
| 2. Idaho region | 563 | 2,534 | 3,518 | 6,052 | 37 |
| 3. Winter wheat belt | 157 | 706 | 221 | 927 | 6 |
| 4. Rocky Mountain region | 72 | 324 | 242 | 566 | 3 |
| 5. Spring wheat belt | 115 | 518 | ..... | 518 | 3 |
| 6. Other states | 24 | 108 | 4 | 112 | 1 |
| Total | 2,469 | 11,093 | 5,127 | 16,220 | 100 |

*Rail movement on calendar-year basis. Water movement on crop-year basis beginning July, 1926.

†States included in regions: 1. Washington and Oregon. 2. Idaho, Montana, Utah, Nevada. 3. Kansas, Nebraska, Missouri, Oklahoma, Texas. 4. Colorado, New Mexico, Wyoming, Arizona. 5. Minnesota, North and South Dakota, Wisconsin.

Sources of data:

Col. 1 from table 3.
Col. 2 is equal to column 1 multiplied by 4.5.
Col. 3 from table 2.
Col. 4 is column 2 plus column 3.

5,127,000 bushels of wheat were brought in annually. Considering one barrel of flour to be equivalent to 4.5 bushels of wheat, the flour and wheat together amount to an equivalent of 16,220,000 bushels. This is 2,651,000 bushels more than the average production of 13,569,000 bushels in California during 1926–1929.

The wheat as grain comes principally from four districts: the Idaho region,[5] the Pacific Northwest, Rocky Mountain states other than the Idaho region, and the winter wheat belt, principally Kansas as shown by table 2. During the four years just mentioned, 69 per cent came from the Idaho region, 22 per cent from the Pacific Northwest, 5 per cent from Colorado, New Mexico, Wyoming, and Arizona, 4 per cent from the winter wheat belt, and less than 1 per cent from

TABLE 2

WHEAT AS GRAIN BROUGHT INTO CALIFORNIA BY RAIL AND WATER BY REGIONS OF ORIGIN, 1926–1929*

| Region of origin† | 1926 | 1927 | 1928 | 1929 | Average 1926–1929 | Per cent of average total |
|---|---|---|---|---|---|---|
| | *1,000 bushels* | *1,000 bushels* | *1,000 bushels* | *1,000 bushels* | *1,000 bushels* | |
| 1. Idaho region | 2,912 | 3,352 | 3,943 | 3,864 | 3,518 | 69 |
| 2. Pacific Northwest— | | | | | | |
| By rail | 37 | 156 | 110 | 63 | 91 | 22 |
| By water | 760 | 1,040 | 690 | 1,713 | 1,051 | |
| 3. Rocky Mountain region‡ | 214 | 459 | 178 | 117 | 242 | 5 |
| 4. Winter wheat belt | 382 | 205 | 174 | 123 | 221 | 4 |
| 5. Other states | 7 | 9 | 1 | 1 | 4 | ..... |
| Total by rail | 3,552 | 4,181 | 4,406 | 4,168 | 4,076 | ..... |
| Total including by water | 4,312 | 5,221 | 5,096 | 5,881 | 5,127 | 100 |

*Rail movement on a calendar-year basis. Water movement on crop-year basis beginning July 1, of year designated.

†States included in regions: 1. Idaho, Montana, Utah, Nevada. 2. Washington, Oregon. 3. Colorado, New Mexico, Wyoming, Arizona. 4. Kansas, Nebraska, Missouri, Oklahoma, Texas.

‡Other than Idaho region.

Sources of data:

Rail: Consolidated statement of common carriers.

Water: Commercial Review, Portland, Oregon (annual statistical numbers).

other states. The wheat coming from east of the Rockies is of the red type, and more than 50 per cent of that coming from the Rocky Mountain states is also of the red type.

In the case of flour the Pacific Northwest, as shown by table 3, is the principal outside source, furnishing 62 per cent of the total. Approximately 23 per cent comes from the Idaho region, 6 per cent from the winter wheat belt, 5 per cent from the spring wheat section, principally from Minnesota, and 4 per cent from other states. The Pacific Northwest has a greater milling capacity relative to its production than does Idaho, which undoubtedly accounts for the fact that the former ships relatively more flour to California.

[5] Idaho region includes Idaho, Montana, Utah, and Nevada.

If wheat and flour are considered together, as illustrated in figure 2, expressing flour in wheat equivalents at 4.5 bushels per barrel and adding it to wheat sold as grain, the Pacific Northwest is the most important source, furnishing 50 per cent of our import supplies. The

TABLE 3

FLOUR MOVEMENT INTO CALIFORNIA BY RAIL AND WATER BY REGIONS OF ORIGIN, 1926–1929*

| Region of origin† | 1926 | 1927 | 1928 | 1929 | Average 1926–1929 | |
|---|---|---|---|---|---|---|
| | *1,000 bbls.* | *1,000 bbls.* | *1,000 bbls.* | *1,000 bbls.* | *1,000 bbls.* | *per cent* |
| 1. Pacific Northwest— | | | | | | |
| By rail | 94 | 85 | 81 | 74 | 84 | 62 |
| By water | 1,438 | 1,609 | 1,523 | 1,248 | 1,454 | |
| 2. Idaho region | 495 | 537 | 609 | 613 | 563 | 23 |
| 3. Winter wheat belt | 188 | 134 | 142 | 165 | 157 | 6 |
| 4. Spring wheat region | 108 | 107 | 128 | 115 | 115 | 5 |
| 5. Rocky Mountain region‡ | 94 | 101 | 41 | 52 | 72 | 3 |
| 6. Other states | 29 | 30 | 18 | 19 | 24 | 1 |
| Total by rail | 1,008 | 994 | 1,019 | 1,038 | 1,015 | ..... |
| Total including by water | 2,446 | 2,603 | 2,542 | 2,286 | 2,469 | 100 |

*Rail movement on calendar-year basis. Water movement on crop-year basis beginning July of year designated. Receipts at Los Angeles include a relatively small amount coming through the Panama Canal. 1929 is subject to minor revision.

†States included in regions: 1. Washington, Oregon. 2. Idaho, Montana, Utah. 3. Kansas, Nebraska, Oklahoma, Texas, Missouri. 4. North and South Dakota, Minnesota, Wisconsin. 5. Colorado, New Mexico, Wyoming.

‡Other than Idaho region.

Sources of data:
Rail: Consolidated statement of common carriers.
Water: Commercial Review, Portland, Oregon (annual statistical numbers).

WHEAT AND FLOUR BROUGHT INTO CALIFORNIA BY REGIONS OF ORIGIN, 1926–1929

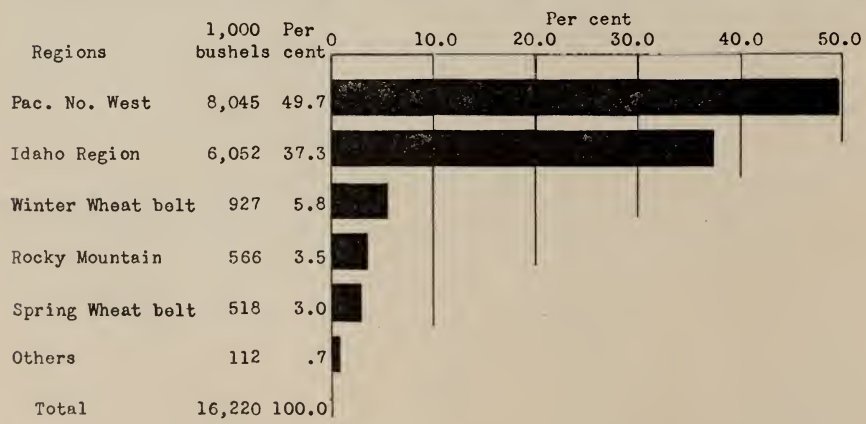


Fig. 2.—California import supplies come principally from the Pacific Northwest and from the Idaho region.

Data from table 1.

Idaho region is second in importance and furnishes 37 per cent, while 13 per cent comes from the spring and winter wheat belts and from mountain states not already mentioned.

## DISPOSITION OF CALIFORNIA WHEAT SUPPLY

California disposes of her wheat supply mainly through four channels: first, human consumption as flour; second, food for livestock, principally poultry; third, exports, the greater portion of which are in the form of flour; fourth, seed. The proportion utilized in each of these ways is shown in figure 3. During the period 1926–1929 from

DISPOSITION OF WHEAT SUPPLY IN CALIFORNIA, 1926–1929

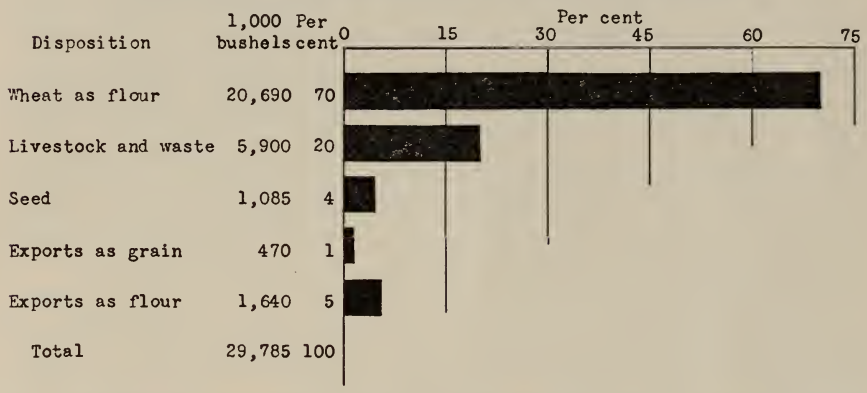


Fig. 3.—California consumes 70 per cent of her wheat supply in the form of flour. Data from table 21.

an annual average supply of 29,800,000 bushels, 20,690,000, or 70 per cent, was used in the form of flour, of which an equivalent of 1,640,000 bushels was exported. Approximately 5,915,000 bushels or 20 per cent was fed to livestock. This includes, however, the amounts destroyed by rodents and wasted. The actual amount fed to livestock, therefore, was somewhat less than 5,900,000 bushels. It is estimated that 1,085,000 bushels, or 4 per cent of the supply, was used for seed. This is based upon an average of 813,000 acres seeded at the rate of 80 pounds per acre. The rate of seeding varies considerably throughout the state, but the 80-pound rate represents the weighted average as based upon replies to questionnaires sent to farm advisors throughout the state. In spite of large imports there are also some exports, amounting to 2,110,000 bushels, principally in the form of flour. This includes mixed flour and flour low in protein which goes to Central America, where there is a considerable demand for this type.

## WHEAT PRICES

Because California is to such a large extent dependent upon outside sources for her wheat supply, the price movement of California wheat is in a large measure determined by conditions outside of the state. The California price of wheat moves more closely with the Portland price than it does with that of any other market in the United States. Portland in turn, because of its volume of export to Europe, reflects changes in the world price of white wheats, which is established in Liverpool and in London. Australian wheat, which is sold in large volume in Europe, is similar in nature to that grown in the Pacific Northwest and California.[6] The price of white wheat, therefore, is determined by the world price if wheat which is established in Liverpool and London, except for premiums and discounts. It should be remembered, of course, that white wheat exerts its proportional influence in establishing the world price of wheat. The price of wheat at Liverpool and London may properly be considered as being the most representative world wheat price, because Great Britain is the greatest single importer of wheat.[7] Wheat enters Great Britain duty free and is drawn from many parts of the world.

*Factors Affecting the World Price of Wheat.*—The movement of the average world price of wheat from one season to another is affected principally by four factors: first, the volume of production in the United States, Canada, Argentina, and Australia, the principal exporting areas; second, the size of the European crop; third, the carryover of wheat in exporting countries and in Great Britain; fourth, the buying power of consumers.

These factors do not, of course, exert an equal influence on the price of wheat, nor do the same ones operate in the same direction each year. This is brought out by comparing each season in the light of these factors. The seasons of 1924–25 and 1929–30 are outstanding examples and illustrate most clearly the operation of these forces. In 1924–25 three of these factors were such as to cause the price of wheat to rise, while only one factor exerted the opposite influence. The production of wheat in the export area was 10 per cent less in 1924–25 than in 1923–24. Production in Europe (excluding Russia) was 70 per cent as large as in the export area while in the previous year it

[6] Clark, J. A., *et al.* Australian wheat varieties in the Pacific Coast area. U. S. Dept. Agr. Dept. Bul. 877:1–25. 1920.

[7] For detailed explanation of the world wheat price series, see: Food Research Institute, Stanford University. Wheat Studies 4(8):289. 1928.

was 76 per cent as large. The buying power of consumers in the United States and in Europe was good. This was particularly true in Europe because of the establishment of stabilized currencies during that year. The only factor exerting a price-depressing influence was carryover, which was 43 million bushels larger than in 1923. The increased carryover, however, was not sufficient to offset the other three factors. Consequently, the world price averaged 58 cents a bushel higher in 1924–25 than in the previous year.

In 1929–30 as contrasted with 1924–25, the only factor favorable to higher prices was the short crop in the export areas, which was nearly 600 million bushels less than that of 1928–29. The influence of this factor on prices was offset by other conditions. The production in Europe was 2 per cent greater than the production in the export areas; normally it is 25 per cent less. The carryover was very large, being 237 million bushels greater than the carryover of the previous year, which was also above average. A general business depression which came during the early part of the autumn of 1929 reduced the buying power of consumers both in this country and abroad. It is also probable that the drop in wheat prices was accentuated by the extreme drop in security prices.

*Price of Wheat at San Francisco.*—The price of wheat at San Francisco, like that of other markets, has followed a widely fluctuating course during the past twenty years, as may be noted from figure 4. During the five crop years of 1909–10 to 1913–14 the price remained very stable and averaged $1.62 a hundred. Immediately after the beginning of the World War it began to rise and averaged $2.02 for 1914–15. This rise was interrupted in all principal markets in 1915–16 by a world production of 3,500,000,000 bushels (excluding Russia and China), the largest crop of wheat the world had ever harvested. After that the price rose steadily. In 1917 government-fixed prices were established and were effective for three years. The drop in prices in 1920 and 1921 is still vivid in the minds of those who watched them fall from $3.67 to $2.04 a hundred. In 1923–24 prices went still lower because of high yields in exporting and in importing areas. In 1924–25, however, with production below normal in the principal export countries as well as in Europe, prices went skyward until for a short time during the season they reached wartime levels, the average for the year being $2.90. Since that time, prices have, except for minor rises, fallen steadily. The average for the five seasons 1925–1929 was $2.31 a hundred, and that of the last two seasons, $2.11 a hundred.

*Relation of the Prices at San Francisco to Portland and Liverpool Prices.*—The price of wheat at San Francisco moves very closely with the price at Portland, but considerably above, as may be noted in figure 5*A*. The San Francisco price has the advantage of a differential above that of Portland by the amount of the expenses incurred in bringing wheat from the Pacific Northwest to California. The spread between California milling wheat at San Francisco and No. 1 western white at Portland has averaged 16 cents a hundred pounds from

PRICE OF MILLING WHEAT AT SAN FRANCISCO, 1909–1929

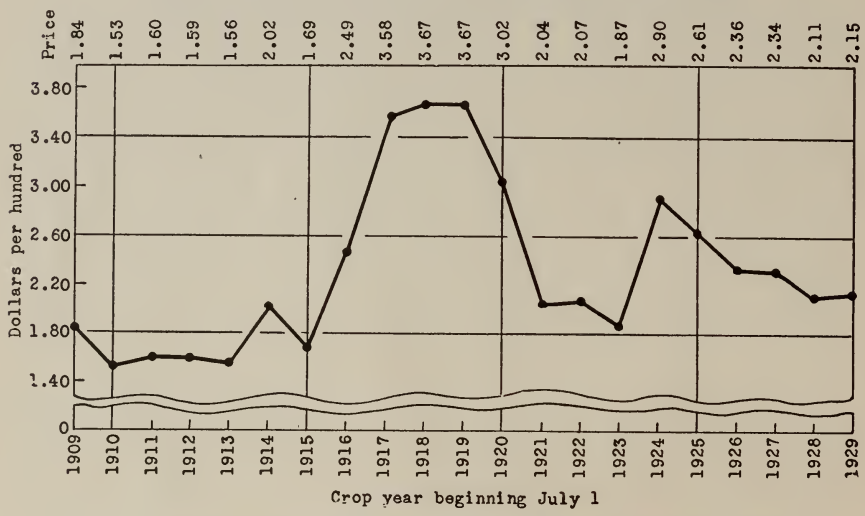


Fig. 4.—The price of California wheat fluctuated widely during the past twenty years.

Data from table 11.

1921–22 to 1929–30. The smallest spread, 9 cents, occurred in 1922–23 and again in 1926–27. The greatest spread, 27 cents, occurred in 1924–25; it was no doubt due to the fact that the California crop in that year was only 50 per cent of normal, making competition keener at local points.

In England wheat from the Pacific Northwest comes in direct competition with wheat from Australia. Consequently, the price of western white at Portland, except for minor differences, moves with the price of Australian wheat at Liverpool and London, as is shown in figure 5B. During the period 1921–1929 the average spread was 26 cents a bushel. The greatest spreads between No. 1 western white at Portland and Australian at Liverpool occur in 1921–22 and 1926–27. These greater spreads are largely explained by higher ocean freight rates from the Pacific Northwest ports, as is shown in table 4.

PRICE OF MILLING WHEAT AT SAN FRANCISCO AND ITS RELATION TO NO. 1 WESTERN WHITE AT PORTLAND, AUSTRALIAN WHEAT IN ENGLAND, AND BRITISH PARCELS (WORLD WHEAT PRICE), 1921–1929

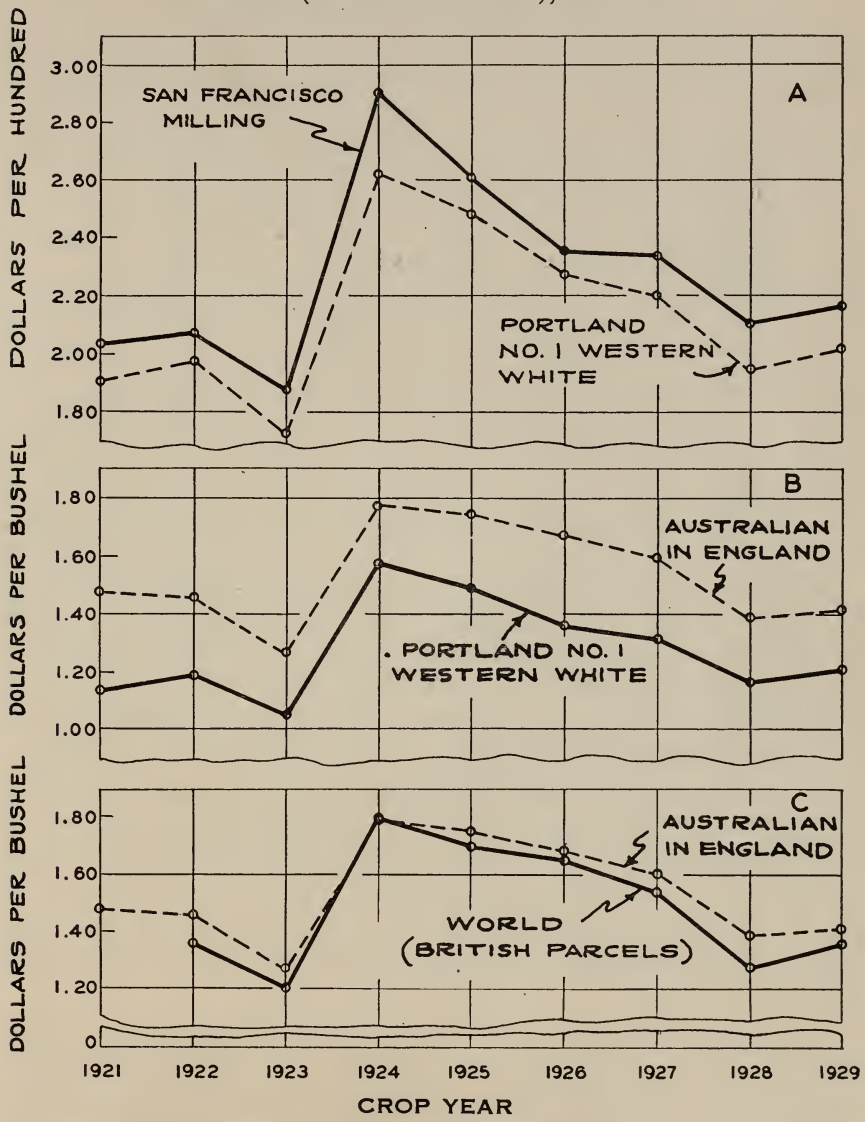


Fig. 5.—The price of wheat at San Francisco moves more closely with the price of wheat at Portland than it does with any other market in the United States. The price at Portland in turn moves very closely with the price of Australian wheat in England. Australian wheat is the same in nature as Pacific Coast wheat.

Date from table 16.

TABLE 4

SPREADS BETWEEN PRICE OF NO. 1 WESTERN WHITE AT PORTLAND AND AUSTRALIAN WHEAT IN ENGLAND* COMPARED WITH OCEAN CARGO FREIGHT RATES FROM PACIFIC NORTHWEST TO UNITED KINGDOM, 1921–1928

| Year | Australian Wheat in England above Portland | Freight rate from Pacific Northwest to United Kingdom |
|---|---|---|
| | *cents per bushel* | *cents per bushel* |
| 1921–22 | 34 | 25 |
| 1922–23 | 27 | 22 |
| 1923–24 | 24 | 21 |
| 1924–25 | 20 | 21 |
| 1925–26 | 26 | 20 |
| 1926–27 | 32 | 24 |
| 1927–28 | 28 | 20 |
| 1928–29 | 22 | 20 |
| 1929–30 | 25 | ..... |
| Average | 26.4 | 22 |

*Liverpool and London.

Sources of data:
Spreads from table 16.
Freight rates from: Food Research Institute, Stanford University, Wheat Studies 6(2): 104. 1929.

*Relation of San Francisco Price to Prices at Eastern Terminal Markets.*—The price of California wheat is also affected in part by the price of wheat in the eastern terminal markets because California draws appreciable quantities of wheat and flour from as far east as the Mississippi Valley. Furthermore, Idaho has three chief outlets for wheat; namely, to export channels via Washington and Oregon, to California, and to eastern terminal markets. Idaho, therefore, directs her shipments to those markets which promise the largest net return. The details of this relation are beyond the scope of this study.

That the price relation between San Francisco and eastern terminal markets of the United States is not as direct as the Portland-Liverpool relation already described is clearly shown by a comparison of figures 5 and 6.

As may be noted in figure 5, the San Francisco price and the Portland price move together consistently. The price of soft winter wheat at St. Louis and the price of hard winter wheat at Kansas City, as shown in figure 6, do not always move in the same direction as does the price of milling wheat at San Francisco, nor do they move the same amount when they do move in the same direction. For example, in 1925 and again in 1927 the price of winter wheat at St. Louis and Kansas City went up, while the price at San Francisco went down.

In 1928 prices at St. Louis and Kansas City went down more than did the San Francisco price.

A similar situation prevails when the average price of all classes and grades at six principal eastern markets is considered. The extreme difference of 29 cents a bushel between San Francisco and the combined average of the six markets is undoubtedly due to the unusual distri-

PRICE OF MILLING WHEAT AT SAN FRANCISCO AND PRICES OF CERTAIN DESIGNATED WHEATS AT EASTERN TERMINAL MARKETS, 1921–1929

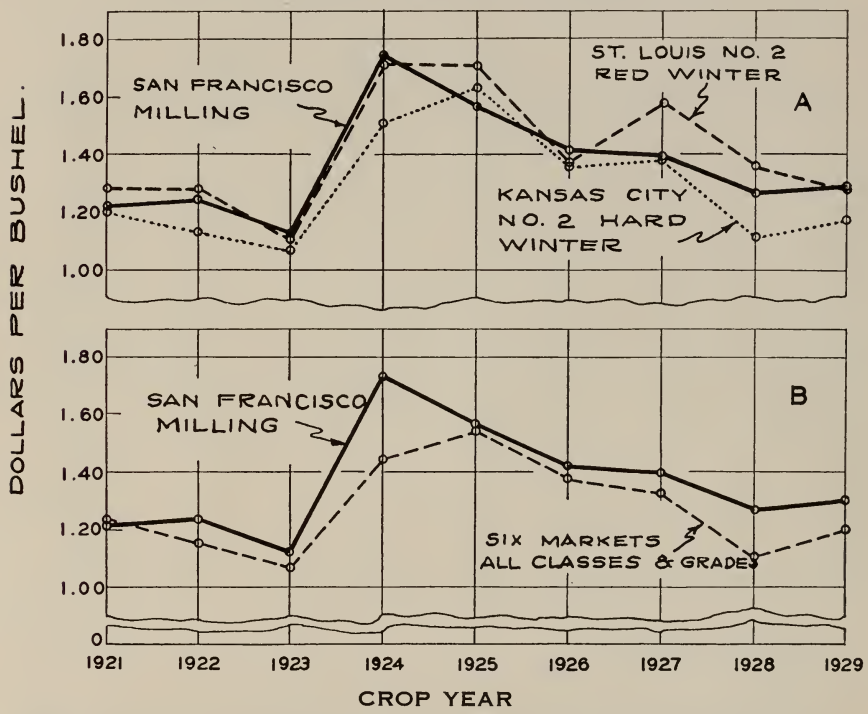


Fig. 6.—The price of wheat at San Francisco in some years moves in an opposite direction to that of the principal terminal markets of the United States.

Data from table 17.

bution of wheat production in 1924. The production of Pacific white wheat was approximately one-half of a normal crop. Canada and Europe had short crops whereas the United States as a whole had a crop 36,000,000 bushels above the average of the previous four years. As a consequence, prices in the principal markets of the United States did not go as high as did the price in world markets and at markets on the Pacific Coast.

*Seasonal Wheat Prices at San Francisco.*—Wheat prices do not follow a distinct seasonal movement. There is, it is true a tendency for prices to be higher in the spring than in the autumn, but the difference is just about sufficient on the average to cover the carrying charges. Considering a period of fourteen years—five seasons before the World War and nine seasons since 1920—as is shown in table 5,

TABLE 5

SEASONAL PRICE CHANGES OF MILLING GRADE WHEAT AT SAN FRANCISCO, 1909–1929, IN DOLLARS PER HUNDRED POUNDS

| Crop year | July–December | January–June* | Increase or decrease | July–June |
|---|---|---|---|---|
| | *dollars* | *dollars* | *dollars* | *dollars* |
| 1909–10 | 1.87 | 1.81 | −.06 | 1.84 |
| 1910–11 | 1.57 | 1.49 | −.08 | 1.53 |
| 1911–12 | 1.50 | 1.70 | +.20 | 1.60 |
| 1912–13 | 1.57 | 1.61 | +.04 | 1.59 |
| 1913–14 | 1.52 | 1.61 | +.09 | 1.56 |
| 1914–15 | 1.78 | 2.27 | +.49 | 2.02 |
| 1915–16 | 1.70 | 1.69 | −.01 | 1.69 |
| 1916–17 | 2.21 | 2.91 | +.70 | 2.49 |
| 1917–18 | 3.67 | 3.50 | −.17 | 3.58 |
| 1918–19 | 3.67 | 3.67 | ..... | 3.67 |
| 1919–20 | 3.67 | 3.67 | ..... | 3.67 |
| 1920–21 | 3.51 | 2.53 | −.98 | 3.02 |
| 1921–22 | 1.94 | 2.14 | +.20 | 2.04 |
| 1922–23 | 1.99 | 2.15 | +.16 | 2.07 |
| 1923–24 | 1.85 | 1.89 | +.04 | 1.87 |
| 1924–25 | 2.65 | 3.15 | +.50 | 2.90 |
| 1925–26 | 2.71 | 2.52 | −.19 | 2.61 |
| 1926–27 | 2.33 | 2.40 | +.07 | 2.36 |
| 1927–28 | 2.22 | 2.46 | +.24 | 2.34 |
| 1928–29 | 2.13 | 2.09 | −.04 | 2.11 |
| 1929–30 | 2.20 | 2.05 | −.15 | 2.12 |

*Following July-December.

Sources of data:

July, 1909-October, 1917: Prices of California Club, compiled from Pacific Rural Press, San Francisco.

November, 1917-July, 1920: Government-fixed prices for No. 1 Hard White. U. S. Dept. Agr. Yearbook of Agriculture **1918**:680, 1919.

1920-1929: Compiled from records of the San Francisco Grain Trade Association.

prices averaged higher during the spring months than they did during the autumn months in the nine crop seasons of 1911–12 to 1913–14, 1921–22 to 1924–25, 1926–27 and 1927–28. In 1909–10, 1910–11, 1925–26, 1928–29, and 1929–30 prices during the spring months averaged lower than during the autumn months. The seasonal price movement for the crops of 1914 to1920 cannot be so compared without a great deal of adjustment because of war and after-war conditions.

## EXPORTS OF WHEAT AND FLOUR FROM THE PACIFIC NORTHWEST BY COUNTRIES OF DESTINATION

The Pacific Northwest normally exports by water 35 million bushels of wheat and 5.5 million barrels of flour.[8] California is the nearest market to the Pacific Northwest; this accounts for the fact that our wheat situation is related to the world situation through the Pacific Northwest. As indicated in table 6, Europe is the principal

TABLE 6

EXPORTS OF WHEAT AS GRAIN BY WATER FROM PACIFIC NORTHWEST TO FOREIGN COUNTRIES AND TO DOMESTIC PORTS, 1921–1929, IN THOUSANDS OF BUSHELS

| July–June | California | Other U. S. ports and possessions | Europe | Japan | Others* | Total |
|---|---|---|---|---|---|---|
| 1921–22 | ..... | ..... | 27,709 | 11,945 | 4,782 | ..... |
| 1922–23 | ..... | ..... | 12,305 | 5,230 | 1,373 | ..... |
| 1923–24 | 2,323 | 381 | 14,487 | 9,938 | 7,758 | 34,887 |
| 1924–25 | 2,652 | 87 | 12,703 | 3,998 | 542 | 19,982 |
| 1925–26 | 2,328 | 121 | 15,569 | 5,187 | 500 | 23,705 |
| 1926–27 | 1,454 | 92 | 24,392 | 7,311 | 3,149 | 36,398 |
| 1927–28 | 1,515 | 132 | 41,887 | 6,183 | 360 | 50,077 |
| 1928–29 | 867 | 635 | 21,745 | 3,867 | 1,995 | 29,109 |
| Average 1925–1928 | 1,541 | 245 | 25,898 | 5,637 | 1,501 | 34,822 |
| Per cent of total | 4 | 1 | 75 | 16 | 4 | 100 |

*Adjusted in accordance with total exports to foreign ports as reported by U. S. Dept. of Commerce.

Sources of data:

1921-1923: Watkins J. B., Wheat exporting from Pacific Northwest. Washington Agr. Exp. Sta. Bul. **201**:28. 1926.

1924-1928: Compiled from the Commercial Review, Portland, Oregon (annual issues).

market for Pacific Northwest wheat as grain, 75 per cent of it going there. Japan takes 16 per cent, California 4 per cent, and 5 per cent goes to all other ports. In the case of flour the proportions are noticeably different: as shown in table 7, 31 per cent goes to China and Japan, 20 per cent to California, 26 per cent to other ports in the United States and to United States possessions, 6 per cent to South and Central American countries, 4 per cent to Europe, and 13 per cent to all other countries.

[8] Considering the average during the four years 1925–26 to 1928–29 as normal. The data is not complete for 1929–30.

TABLE 7

FLOUR EXPORTS BY WATER FROM PACIFIC NORTHWEST TO FOREIGN COUNTRIES AND DOMESTIC PORTS, 1921–1929, IN THOUSANDS OF BARRELS

| July–June | California | Other U. S. ports and possessions | Europe | China and Japan* | South and Central America | Others† | Total |
|---|---|---|---|---|---|---|---|
| 1921–22 | 1,348 | 211 | 983 | 2,392 | 253 | 81 | 5,268 |
| 1922–23 | 1,158 | 653 | 424 | 2,594 | 324 | 534 | 5,687 |
| 1923–24 | 1,651 | 947 | 189 | 5,000 | 291 | 558 | 8,636 |
| 1924–25 | 1,402 | 988 | 553 | 660 | 206 | 689 | 4,498 |
| 1925–26 | 1,145 | 1,257 | 158 | 1,028 | 354 | 614 | 4,556 |
| 1926–27 | 968 | 1,365 | 205 | 1,197 | 387 | 704 | 4,826 |
| 1927–28 | 1,294 | 1,438 | 288 | 1,939 | 295 | 825 | 6,079 |
| 1928–29 | 1,051 | 1,741 | 152 | 2,722 | 265 | 814 | 6,745 |
| Average 1925–1928 | 1,115 | 1,450 | 200 | 1,720 | 325 | 740 | 5,550 |
| Per cent of total | 20 | 26 | 4 | 31 | 6 | 13 | 100 |

*Japan very minor.

†Adjusted in accordance with total exports to foreign ports as reported by U. S. Dept. of Commerce.

Sources of data:

1921-1923: Watkins, J. B., Wheat exporting from Pacific Northwest, Washington Agr. Exp. Sta. Bul. **201**:28. 1926.

1924-1929: Compiled from Commercial Review, Portland, Oregon (annual issues).

## INTERNATIONAL TRADE IN WHEAT

*Net Exports and Net Imports by Principal Countries.*—No other agricultural commodity enjoys so world-wide a market as does wheat. It is a staple food for many peoples of the world and lends itself readily to international trade because it can be purchased sight unseen; it can easily be handled and has a value that is high relative to its bulk. There are five principal export areas, which are arranged in order of their importance in table 8. North America, that is, Canada and the United States, furnishes 62 per cent of the net exports, Argentina 18 per cent, Australia 12 per cent, the Danube region (southeastern Europe) 5 per cent, and North Africa and Chile together 1 per cent.

There are also five principal import areas. Northern continental Europe receives 42 per cent of the reported net imports, Great Britain and Ireland 36 per cent, southern Europe, principally Italy, 16 per cent, the Scandinavian countries 2 per cent, Japan 3 per cent, and Egypt approximately 1 per cent.

TABLE 8

INTERNATIONAL TRADE IN WHEAT (INCLUDING FLOUR EXPRESSED IN WHEAT EQUIVALENT), NET EXPORTS AND NET IMPORTS BY PRINCIPAL EXPORTING AND IMPORTING COUNTRIES, AVERAGE 1924–1928

| Net exports | | Net imports | |
|---|---|---|---|
| Country | Million bushels | Country | Million bushels |
| Canada | 313 | Northern Europe | 255 |
| United States | 177 | Great Britain | 206 |
| Argentina | 154 | Southern Europe | 100 |
| Australia | 95 | Scandinavia | 26 |
| Danube Region | 37 | Japan | 17 |
| India | 17 | Egypt | 10 |
| Others | 9 | | |
| Total | 802 | Total | 614* |

*Does not balance with net exports because import data in many countries are not available.

Source of data:
Compiled from: Food Research Institute, Stanford University, Wheat Studies 6(2): 100. 1929.

*Tariff Rates on Wheat by Principal countries.*—The movement of wheat in international trade encounters many barriers. Tariff walls are very numerous in Europe and some of them are as high as and higher than the present market price of certain wheats in our markets. Table 9 lists the principal countries having import duties and the present rate.

TABLE 9

IMPORT TARIFF RATES ON WHEAT IN CERTAIN FOREIGN COUNTRIES

| Country | Duty in cents per bushel of 60 pounds* |
|---|---|
| Spain | |
| First tariff | 220.61 |
| Second tariff† | 73.54 |
| Germany | 97.24 |
| Italy | 86.67 |
| France | 85.35 |
| Czechoslovakia— | |
| Maximum | 48.34 |
| Minimum‡ | 24.17 |
| Japan (at exchange rate, July 17, 1929) | 33.92 |
| Poland (except by special permit) | 33.59 |
| Sweden (at exchange rate, July 17, 1929) | 26.99 |
| Austria | 11.03 |

*At par exchange rate unless otherwise stated. †Applies to imports from United States.

‡To countries having a most-favored-nation treaty with Czechoslovakia; applies to imports from United States.

Source of data: U. S. Dept. Agr., Bur. Agr. Econ. Foreign News on Wheat. FS/wh-49:21. May, 1930.

*Seasonal Distribution of Net Exports by Principal Countries.*—Since some of the principal exporting countries are located on each side of the equator, net exports are relatively uniform throughout the

WHEAT EXPORTS FROM PRINCIPAL EXPORTING COUNTRIES BY MONTHS, AVERAGE 1924–1928

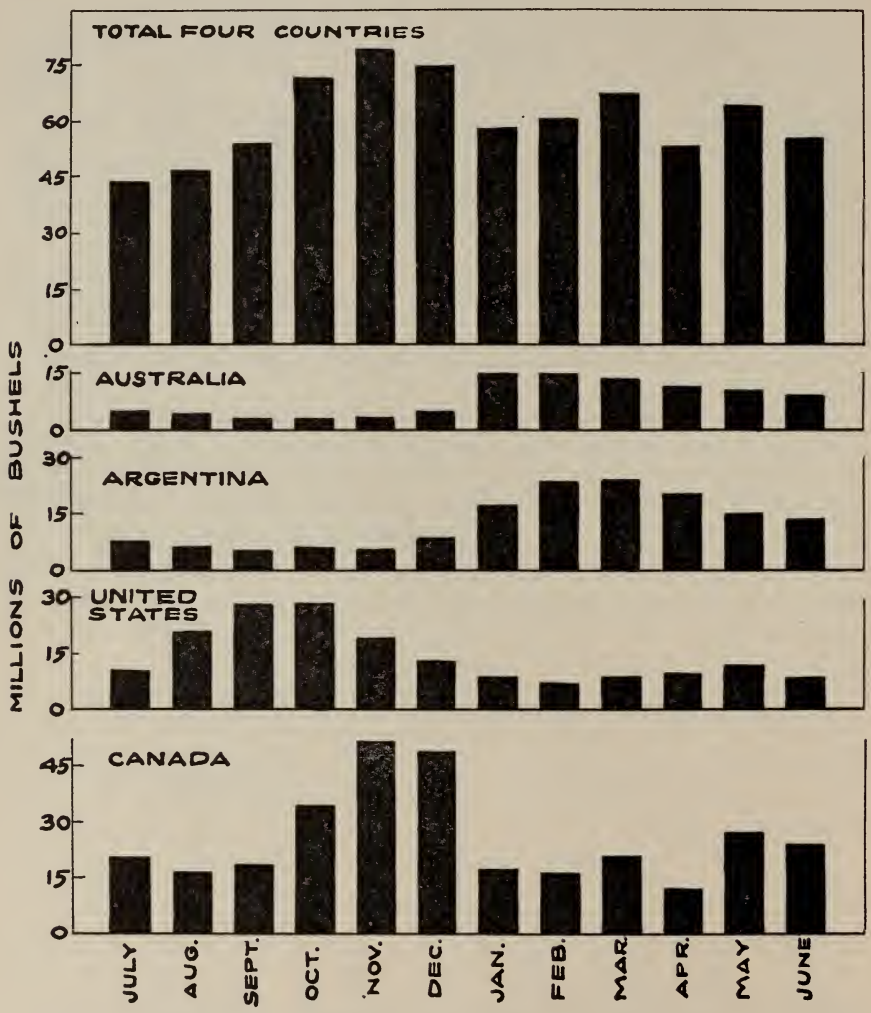


Fig. 7.—During the six months, July–December, United States and Canada are the dominant factors in wheat exports. During the six months, January-June, Argentina and Australia are the dominant factors.

Data from table 18.

year. On an average, total net exports from the four principal exporting countries during the crop years 1924–25 to 1928–29, as shown in figure 7, increase steadily from about 45,000,000 bushels in July to

78,000,000 bushels in November. After November net exports are more irregular, chiefly because of irregular shipments from Canada, depending upon the severity of winter weather. During August and September the United States is the principal exporter. Through October, November, and December, Canada is dominant. From January to April, inclusive, Argentina and Australia are the principal exporters in the market. After spring thaws, during May and June, Canada again becomes an important factor. During the six months July–December, Canada normally ships out 62 per cent of her exportable surplus, and the United States ships out 68 per cent, whereas Argentina and Australia normally ship out 75 per cent of their exportable surplus during the six months January–June: If Russia becomes an important factor her heaviest shipments will come during the same months as those of the United States and Canada.

## TREND OF WHEAT PRODUCTION IN PRINCIPAL WHEAT-PRODUCING AREAS OF THE WORLD

The future trend in wheat production in Canada, United States, Argentina, and Australia will have an important bearing upon the world level of wheat prices and in turn upon prices in California, because these countries are the principal wheat-exporting areas. The increase in wheat production that has occurred in these countries since 1909 is shown in figures 8 and 9. The production of wheat in the United States—the principal wheat-producing country in the world—has increased from an average of 690 million bushels in 1909–1913 to a 1920–1929 average production of 828 million bushels, an increase of 138 million bushels, or 20 per cent. From pre-war time Canada has had the most phenomenal increase in production of all important wheat countries. The trend has been steadily upward from 150 million bushels in 1909 to 450 million bushels in 1929. This is an increase of 300 million bushels or 200 per cent, through a period of twenty years. Production in Argentina, as in Canada, has increased very steadily, but not to the same extent. The trend in Argentina has increased from a computed normal of 135 million bushels in 1909 to a computed normal of 245 million bushels in 1929, an increase of 110 million bushels, or 80 per cent, which is equal to 5.5 million bushels annually over the same twenty-year period. Production in Australia has a tendency to be very erratic; from 1914 to 1915 it fell from 103 million to 24 million bushels, and rose in 1916 to 179 million bushels. Since 1924 it has fluctuated between 110 million and 165 million bushels, the

average production during the period 1924–1929 being 138 million bushels. The trend of production has not been upward since 1915.

Through the past decade European production has increased faster than that of any other area. This increase is, however, in the nature of a recovery from the decline in production that occurred during the war. The average 1909–1913 production was 1,270 million bushels. By 1917 production had declined to 740 million bushels and since then

TREND OF WHEAT PRODUCTION IN UNITED STATES AND CANADA, 1909–1929

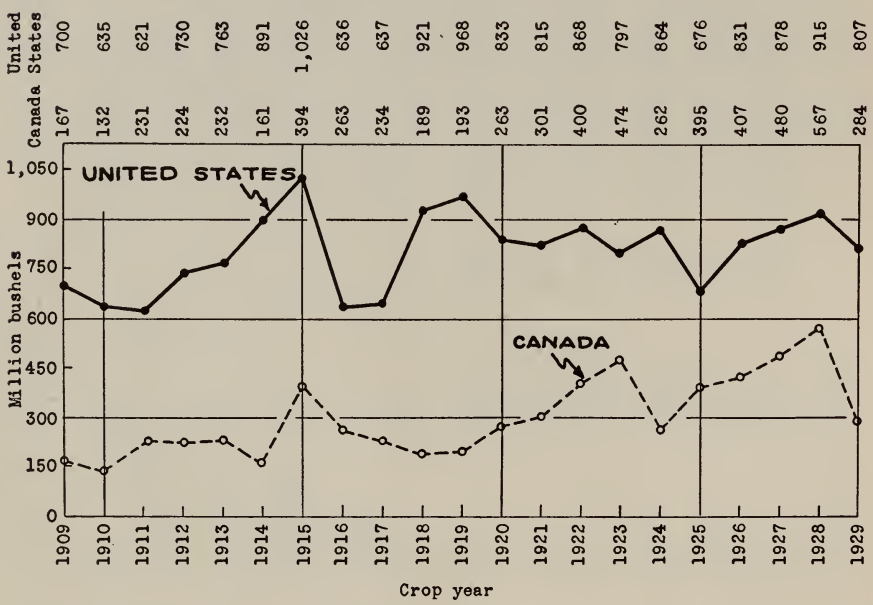


Fig. 8.—The trend of wheat production in the United States has not been upward since 1915. The upward trend of production in Canada has averaged 15 million bushels annually during the twenty years, 1909–1929.

Data from table 19.

has risen to 1,400 million bushels. It is doubtful, however, whether this increase will continue at as rapid a rate, since production is now somewhat above the pre-war level.

Russia appears to be the potential source of a large supply. In 1913 Russia's production, as is shown in figure 10, reached the huge total of 1,028 million bushels. Wheat production was interfered with during the war period and for some years afterward. The grain trade estimates Russia's 1929 production to have been 920 million bushels. Under the present government, thousands of acres of small peasant holdings have been consolidated into large tracts operated by modern

machinery.[9] If this program is successful we may expect Russia to become an important factor in export wheat. The Bureau of Agricultural Economics, in a recent publication, says, "Russia is likely to re-enter the export field as an important competitor within the next decade. Russia has large undeveloped resources for wheat produc-

TREND OF WHEAT PRODUCTION IN ARGENTINA AND AUSTRALIA, 1909–1929

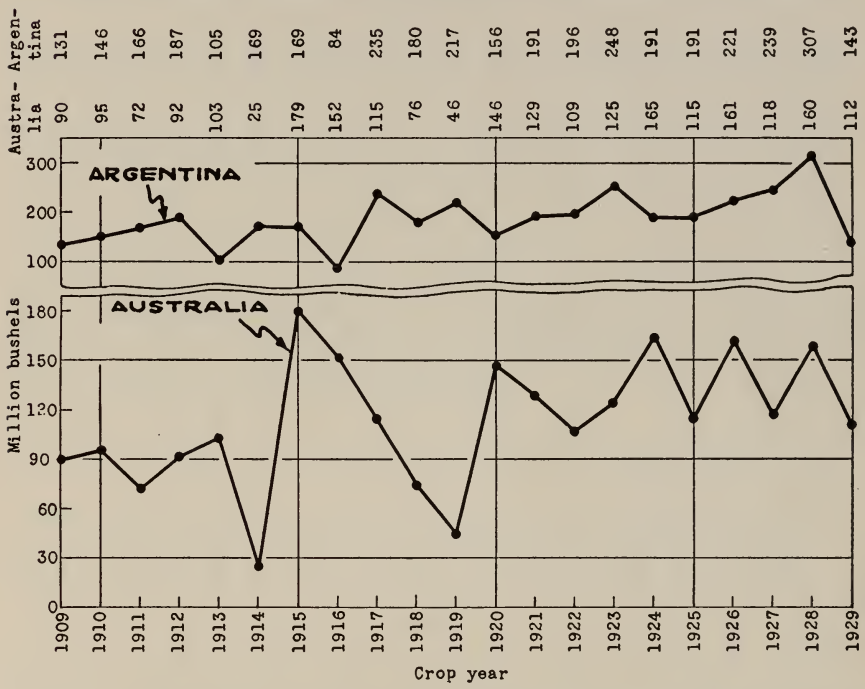


Fig. 9.—The upward trend of wheat production in Argentina has averaged 5.5 million bushels annually during the past twenty years. The trend of wheat production in Australia has not been upward since 1915.

Data from table 19.

tion. The Soviet Government is making strenuous efforts to introduce machinery and to improve methods of growing the crop. There is reason to expect that these efforts will result in increasing exports and evidently in a large surplus that will be pressed upon the export market."[10]

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[9] Personal interview with Dr. M. L. Wilson of Montana Agricultural College, recently returned from Russia, where he acted in an official capacity to assist in the organization of large-scale farming operations.

[10] Staff of the Bureau of Agricultural Economics. The world wheat outlook, 1930. U. S. Dept. Agr. Misc. Publ. 95:3. 1930.

The combined harvester is coming into extensive use. According to the 1930 Yearbook of Agriculture of the United States Department of Agriculture, more than 50 per cent of the hard winter wheat and 20 per cent of the hard spring wheat in this country was harvested by combines in 1929. The combine eliminates the grain binder and

TREND OF WHEAT PRODUCTION IN EUROPE, EXCLUDING RUSSIA, AND IN RUSSIA, 1909–1929

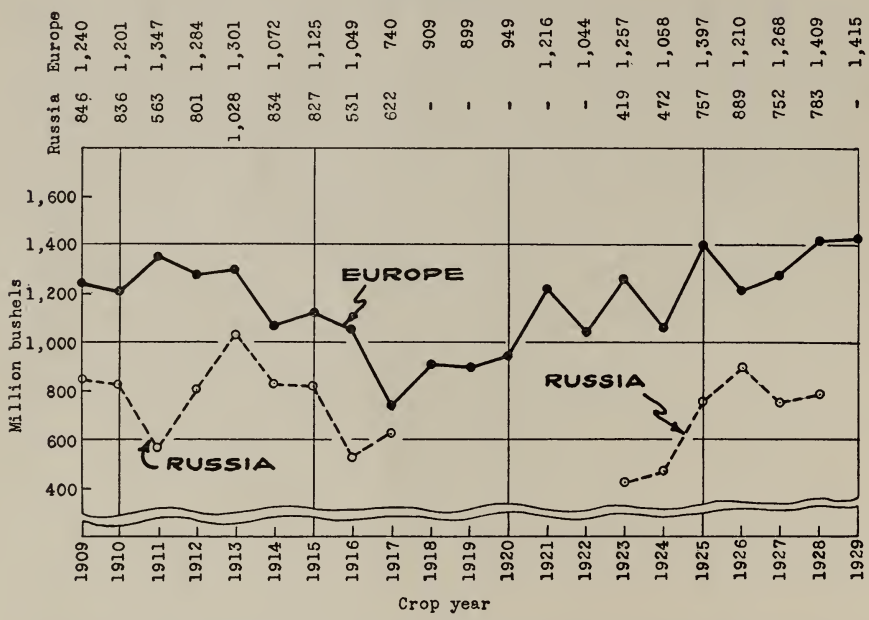


Fig. 10.—The upward trend of wheat production in Europe since the war has been in the nature of a recovery from the decline that took place during the war. The trend is not likely to continue upward at the same rate as that which prevailed from 1917 to 1928. Russia, however, from current reports, appears to be a potential source of large supplies.

Data from table 19.

the threshing machine; it also eliminates shocking and in some instances, stacking. These economies greatly reduce the cost of harvesting and will tend to increase wheat acreage and bring keen competition to areas where combines are not used. The combined harvester will also tend to expand wheat production, particularly in those areas which are not now producing wheat but which are capable of producing wheat at a profit if production costs are low enough.

## ACKNOWLEDGMENTS

The writer of this bulletin wishes to express his appreciation to the following persons and organizations that have generously contributed from their data and their time to make this study possible: California Cooperative Crop Reporting Service; Bureau of Agricultural Economics, United States Department of Agriculture; Bureau of Foreign and Domestic Commerce, United States Department of commerce; Food Research Institute, Stanford University; Division of Agricultural Economics, University of California; Pacific Freight Traffice Bureau, San Francisco; Sperry Flour Company; Globe Milling Company; Tarr and McComb Corporation, Los Angeles; San Francisco Chamber of Commerce; Los Angeles Grain Exchange; and particularly Dr. H. R. Wellman and Mr. J. E. Coke, fellow associates, for their personal counsel and interest.

## APPENDIX OF TABLES

### TABLE 10

CALIFORNIA WHEAT ACREAGE, PRODUCTION, AND YIELD PER ACRE, 1870–1909, BY FIVE-YEAR AVERAGES, 1909–1929 ANNUAL

| Year | Acreage harvested | Production | Yield per acre |
|---|---|---|---|
| | *1,000 acres* | *1,000 bushels* | *bushels* |
| Average | | | |
| 1870–1874 | 1,622 | 21,283 | 13.8 |
| 1875–1879 | 2,352 | 30,540 | 12.9 |
| 1880–1884 | 2,681 | 36,395 | 13.4 |
| 1885–1889 | 2,867 | 33,084 | 11.5 |
| 1890–1894 | 2,712 | 34,061 | 12.5 |
| 1895–1899 | 2,630 | 32,711 | 12.2 |
| 1900–1904 | 2,197 | 24,812 | 11.2 |
| 1905–1909 | 1,290 | 17,635 | 14.0 |
| Annual | | | |
| 1909 | 825 | 11,550 | 14.0 |
| 1910 | 550 | 9,900 | 18.0 |
| 1911 | 480 | 8,640 | 18.0 |
| 1912 | 370 | 6,290 | 17.0 |
| 1913 | 300 | 4,200 | 14.0 |
| 1914 | 400 | 6,800 | 17.0 |
| 1915 | 440 | 7,040 | 16.0 |
| 1916 | 350 | 5,600 | 16.0 |
| 1917 | 375 | 7,425 | 19.8 |
| 1918 | 506 | 7,590 | 15.0 |
| 1919 | 1,087 | 16,848 | 15.0 |
| 1920 | 714 | 9,996 | 14.0 |
| 1921 | 557 | 8,355 | 15.0 |
| 1922 | 712 | 15,308 | 21.5 |
| 1923 | 748 | 16,157 | 21.6 |
| 1924 | 377 | 5,655 | 15.0 |
| 1925 | 603 | 11,457 | 19.0 |
| 1926 | 653 | 12,015 | 18.4 |
| 1927 | 812 | 13,642 | 16.8 |
| 1928 | 780 | 16,380 | 21.0 |
| 1929 | 680 | 12,240 | 18.0 |
| 1930* | 714 | 14,994 | 21.0 |

*Preliminary from current crop reports.

Sources of date:

1870-1911: Report of the California State Board of Agriculture **1911**:119. 1912.

1912:1920: Statistical Report of the California State Board of Agriculture, **1921**:151. 1922.

1921-1929: California Cooperative Crop Reporting Service, Annual Crop Reports.

## TABLE 11

PRICE OF MILLING WHEAT AT SAN FRANCISCO, BY MONTHS, 1909–1929, IN DOLLARS PER HUNDRED POUNDS

| Year | July | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | April | May | June | Average July-June |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1909–10 | 2.07 | 1.87 | 1.70 | 1.75 | 1.82 | 1.98 | 2.04 | 1.96 | 1.90 | 1.76 | 1.65 | 1.55 | 1.84 |
| 1910–11 | 1.61 | 1.69 | 1.61 | 1.53 | 1.45 | 1.50 | 1.52 | 1.49 | 1.42 | 1.51 | 1.51 | 1.47 | 1.53 |
| 1911–12 | 1.47 | 1.45 | 1.49 | 1.52 | 1.52 | 1.53 | 1.55 | 1.59 | 1.65 | 1.79 | 1.89 | 1.70 | 1.60 |
| 1912–13 | 1.66 | 1.61 | 1.59 | 1.53 | 1.52 | 1.51 | 1.54 | 1.59 | 1.59 | 1.60 | 1.65 | 1.68 | 1.59 |
| 1913–14 | 1.58 | 1.53 | 1.54 | 1.50 | 1.47 | 1.50 | 1.54 | 1.61 | 1.62 | 1.64 | 1.63 | 1.61 | 1.56 |
| 1914–15 | 1.60 | 1.61 | 1.79 | 1.72 | 1.93 | 2.03 | 2.26 | 2.44 | 2.41 | 2.37 | 2.21 | 1.85 | 2.02 |
| 1915–16 | 1.75 | 1.80 | 1.57 | 1.66 | 1.68 | 1.71 | 1.75 | 1.81 | 1.68 | 1.64 | 1.62 | 1.65 | 1.69 |
| 1916–17 | 1.71 | 1.94 | 2.13 | 2.24 | 2.59 | 2.64 | 2.61 | 2.67 | 2.81 | 3.56 | ..... | ..... | 2.49 |
| 1917–18 | 3.65 | 3.91 | 3.85 | 3.62 | 3.50 | 3.50 | 3.50 | 3.50 | 3.50 | 3.50 | 3.50 | 3.50 | 3.58 |
| 1918–19* | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 |
| 1919–20* | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 | 3.67 |
| 1920–21 | 4.25 | 3.30 | 3.82 | 3.63 | 3.24 | 2.80 | 2.99 | 2.86 | 2.68 | 2.09 | 2.21 | 2.35 | 3.02 |
| 1921–22 | 2.00 | 1.94 | 2.01 | 1.91 | 1.89 | 1.90 | 1.88 | 2.09 | 2.28 | 2.33 | 2.32 | 1.91 | 2.04 |
| 1922–23 | 1.90 | 1.84 | 1.85 | 1.92 | 2.13 | 2.28 | 2.28 | 2.23 | 2.18 | 2.21 | 2.12 | 1.90 | 2.07 |
| 1923–24 | 1.81 | 1.81 | 1.91 | 1.94 | 1.88 | 1.77 | 1.76 | 1.88 | 1.84 | 1.84 | 1.91 | 2.11 | 1.87 |
| 1924–25 | 2.38 | 2.52 | 2.48 | 2.74 | 2.78 | 2.99 | 3.26 | 3.67 | 3.33 | 2.82 | 2.88 | 2.95 | 2.90 |
| 1925–26 | 2.71 | 2.78 | 2.72 | 2.53 | 2.72 | 2.79 | 2.81 | 2.51 | 2.50 | 2.56 | 2.45 | 2.27 | 2.61 |
| 1926–27 | 2.39 | 2.34 | 2.17 | 2.34 | 2.40 | 2.35 | 2.38 | 2.40 | 2.40 | 2.30 | 2.52 | 2.40† | 2.36 |
| 1927–28 | 2.28 | 2.25 | 2.22 | 2.15 | 2.17 | 2.27 | 2.32 | 2.39 | 2.48 | 2.66 | 2.63 | 2.26 | 2.34 |
| 1928–29 | 2.22 | 2.02 | 2.09 | 2.19 | 2.12 | 2.13 | 2.14 | 2.18 | 2.16 | 2.12 | 2.05 | 1.88 | 2.11 |
| 1929–30 | 2.09 | 2.26 | 2.22 | 2.21 | 2.16 | 2.30 | 2.21 | 2.11 | 2.04 | 2.07 | 2.01† | 1.78† | 2.12 |

*Government prices changed due to new freight rates.

†Pacific Rural Press quotation.

Sources of data:

July 1909-Oct. 1917: Prices of California Club compiled from the Pacific Rural Press, San Francisco.

Nov. 1917-June 1920: Government fixed prices for No. 1 Hard White. U. S. Dept. Agr. Yearbook of Agriculture **1918**:680, 1919.

July 1920-April 1930: Compiled from records of the San Francisco Grain Exchange.

## TABLE 12

PRICE OF NO. 1 WESTERN WHITE AT PORTLAND, OREGON, BY MONTHS, 1921–1929, IN DOLLARS PER BUSHEL

| Years | July | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | April | May | June | Average July-June |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921–22 | 1.13 | 1.10 | 1.12 | 1.04 | 1.02 | 1.07 | 1.08 | 1.20 | 1.27 | 1.26 | 1.25 | 1.16 | 1.14 |
| 1922–23 | 1.11 | 1.08 | 1.09 | 1.13 | 1.22 | 1.23 | 1.26 | 1.27 | 1.25 | 1.26 | 1.23 | 1.10 | 1.19 |
| 1923–24 | 1.04 | 1.05 | 1.06 | 1.04 | 1.02 | 1.00 | 1.00 | 1.00 | .98 | 1.00 | 1.06 | 1.13 | 1.03 |
| 1924–25 | 1.29 | 1.34 | 1.39 | 1.51 | 1.58 | 1.69 | 1.87 | 1.85 | 1.72 | 1.52 | 1.60 | 1.59 | 1.58 |
| 1925–26 | 1.43 | 1.50 | 1.47 | 1.37 | 1.50 | 1.59 | 1.61 | 1.55 | 1.48 | 1.50 | 1.45 | 1.40 | 1.49 |
| 1926–27 | 1.41 | 1.34 | 1.30 | 1.37 | 1 35 | 1.34 | 1.34 | 1.33 | 1.32 | 1.33 | 1.46 | 1.44 | 1.36 |
| 1927–28 | 1.33 | 1.31 | 1.25 | 1.24 | 1.25 | 1.25 | 1.28 | 1.27 | 1.36 | 1.48 | 1.46 | 1.41 | 1.32 |
| 1928–29 | 1.31 | 1.15 | 1.15 | 1.18 | 1.17 | 1.17 | 1.17 | 1.26 | 1.18 | 1.15 | 1.08 | 1.09 | 1.17 |
| 1929–30 | 1.28 | 1.23 | 1.23 | 1.19 | 1.19 | 1.23 | 1.23 | 1.12 | 1.08 | 1.09 | 1.04 | .98 | 1.16 |

Sources of data:

July, 1921-June, 1929: Portland Oregonian, by courtesy of M. K. Bennett of Food Research Institute, Stanford University.

July, 1929-May, 1930: U. S. Dept. Agr., Bur. Agr. Econ. Foreign News on Wheat, monthly issues.

June, 1930: Compiled from the Commercial Review, Portland, Oregon.

## TABLE 13

PRICE OF AUSTRALIAN WHEAT IN ENGLAND, BY MONTHS, 1921–1929, IN DOLLARS PER BUSHEL

| Years | July | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | April | May | June | Average July-June |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921–22 | 1.73 | 1.62 | 1.60 | 1.34 | 1.22 | 1.30 | 1.35 | 1.49 | 1.53 | 1.51 | 1.61 | 1.47 | 1.48 |
| 1922–23 | 1.47 | 1.44 | 1.38 | 1.42 | 1.45 | 1.53 | 1.51 | 1.43 | 1.43 | 1.51 | 1.50 | 1.41 | 1.46 |
| 1923–24 | 1.34 | 1.26 | 1.27 | 1.28 | 1.25 | 1.24 | 1.23 | 1.26 | 1.27 | 1.25 | 1.29 | 1.31 | 1.27 |
| 1924–25 | 1.43 | 1.56 | 1.64 | 1.78 | 1.84 | 1.89 | 2.03 | 2.09 | 1.95 | 1.72 | 1.79 | 1.71 | 1.78 |
| 1925–26 | 1.66 | 1.77 | 1.78 | 1.58 | 1.69 | 1.88 | 1.85 | 1.77 | 1.66 | 1.77 | 1.79 | 1.79 | 1.75 |
| 1926–27 | 1.77 | 1.73 | 1.65 | 1.72 | 1.73 | 1.67 | 1.65 | 1.62 | 1.62 | 1.61 | 1.67 | 1.71 | 1.68 |
| 1927–28 | 1.66 | 1.63 | 1.61 | 1.57 | 1.56 | 1.58 | 1.56 | 1.52 | 1.60 | 1.65 | 1.67 | 1.61 | 1.60 |
| 1928–29 | 1.54 | 1.37 | 1.36 | 1.44 | 1.45 | 1.39 | 1.41 | 1.44 | 1.41 | 1.36 | 1.27 | 1.27 | 1.39 |
| 1929–30 | 1.48 | 1.56 | 1.46 | 1.36 | 1.36 | 1.47 | 1.45 | 1.32 | 1.21 | 1.23 | 1.22 | 1.21 | 1.36 |

Sources of data:

1921-22: International Yearbook of Agricultural Statistics **1924-25**:380. 1925.

1923-29: Food Research Institute, Stanford University. Wheat Studies (current issues).

## TABLE 14

WORLD WHEAT PRICE* BY MONTHS, 1922–1929, IN DOLLARS PER BUSHEL

| Years | July | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | April | May | June | Average July-June |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1922–23 | ..... | 1.32 | 1.24 | 1.36 | 1.38 | 1.41 | 1.38 | 1.36 | 1.34 | 1.40 | 1.40 | 1.33 | 1.36 |
| 1923–24 | 1.24 | 1.20 | 1.21 | 1.22 | 1.20 | 1.18 | 1.20 | 1.24 | 1.21 | 1.19 | 1.22 | 1.26 | 1.21 |
| 1924–25 | 1.43 | 1.54 | 1.60 | 1.77 | 1.81 | 1.86 | 2.02 | 2.09 | 1.96 | 1.74 | 1.85 | 1.81 | 1.79 |
| 1925–26 | 1.70 | 1.78 | 1.64 | 1.50 | 1.62 | 1.84 | 1.81 | 1.74 | 1.62 | 1.72 | 1.74 | 1.70 | 1.70 |
| 1926–27 | 1.69 | 1.64 | 1.60 | 1.73 | 1.74 | 1.65 | 1.60 | 1.61 | 1.59 | 1.57 | 1.64 | 1.68 | 1.65 |
| 1927–28 | 1.62 | 1.62 | 1.56 | 1.52 | 1.50 | 1.49 | 1.48 | 1.46 | 1.52 | 1.59 | 1.60 | 1.48 | 1.54 |
| 1928–29 | 1.41 | 1.26 | 1.26 | 1.29 | 1.29 | 1.26 | 1.31 | 1.35 | 1.31 | 1.25 | 1.16 | 1.17 | 1.28 |
| 1929–30 | 1.41 | 1.44 | 1.42 | 1.38 | 1.32 | 1.41 | 1.42 | 1.28 | 1.17 | 1.16 | 1.14 | 1.13 | 1.31 |

*Based on parcel prices at Liverpool and London.

Sources of data:

July, 1922-June, 1928 and Aug., 1929-June, 1930: Food Research Institute, Stanford University, Wheat Studies (current issues).

July, 1928-July, 1929: U. S. Dept. Agr. Yearbook of Agriculture **1930**:613. 1930.

## TABLE 15

WEIGHTED AVERAGE PRICES OF ALL CLASSES AND GRADES AT SIX* MARKETS, BY MONTHS, 1921–1930, IN DOLLARS PER BUSHEL

| Years | July | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | April | May | June | Weighted average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921–22 | 1.23 | 1.22 | 1.29 | 1.17 | 1.13 | 1.14 | 1.16 | 1.31 | 1.36 | 1.39 | 1.35 | 1.23 | 1.24 |
| 1922–23 | 1.17 | 1.08 | 1.09 | 1.13 | 1.20 | 1.21 | 1.18 | 1.20 | 1.20 | 1.25 | 1.22 | 1.13 | 1.16 |
| 1923–24 | 0.99 | 1.02 | 1.07 | 1.10 | 1.06 | 1.05 | 1.10 | 1.12 | 1.12 | 1.10 | 1.11 | 1.17 | 1.07 |
| 1924–25 | 1.26 | 1.24 | 1.28 | 1.45 | 1.48 | 1.64 | 1.89 | 1.85 | 1.72 | 1.51 | 1.66 | 1.62 | 1.45 |
| 1925–26 | 1.56 | 1.61 | 1.45 | 1.43 | 1.54 | 1.66 | 1.70 | 1.65 | 1.55 | 1.56 | 1.54 | 1.52 | 1.55 |
| 1926–27 | 1.42 | 1.35 | 1.36 | 1.39 | 1.38 | 1.40 | 1.39 | 1.36 | 1.34 | 1.35 | 1.45 | 1.49 | 1.38 |
| 1927–28 | 1.39 | 1.36 | 1.29 | 1.25 | 1.26 | 1.28 | 1.31 | 1.32 | 1.37 | 1.51 | 1.51 | 1.42 | 1.33 |
| 1928–29 | 1.26 | 1.09 | 1.09 | 1.07 | 1.09 | 1.07 | 1.14 | 1.18 | 1.14 | 1.09 | 1.01 | 1.05 | 1.11 |
| 1929–30 | 1.30 | 1.26 | 1.27 | 1.24 | 1.21 | 1.24 | 1.22 | 1.16 | 1.04 | 1.03 | 1.01 | 0.94 | 1.16 |

*Four markets July, 1921-June 1923.

Sources of data:

July, 1921-June, 1923: U. S. Dept. Agr. Yearbook of Agriculture **1928**:688. 1929.

July, 1923-Dec., 1929: U. S. Dept. Agr. Yearbook of Agriculture **1930**:611. 1930.

Jan., 1930-June, 1930: U. S. Dept. Agr., Bur. Agr. Econ., Crops and Markets (monthly issues).

## TABLE 16

WHEAT PRICES AT SAN FRANCISCO AND PORTLAND, AND IN ENGLAND, 1921–1929

| July-June | San Francisco milling | Portland western white | | British parcels | Australian at Liverpool | Argentine at Liverpool |
|---|---|---|---|---|---|---|
| | *dollars per 100 pounds* | *dollars per 100 pounds* | *dollars per bushel* | *dollars per bushel* | *dollars per bushel* | *dollars per bushel* |
| 1921–22 | 2.04 | 1.90 | 1.14 | ..... | 1.48 | ..... |
| 1922–23 | 2.07 | 1.98 | 1.19 | 1.36 | 1.46 | ..... |
| 1923–24 | 1.87 | 1.72 | 1.03 | 1.21 | 1.27 | 1.20 |
| 1924–25 | 2.90 | 2.63 | 1.58 | 1.79 | 1.78 | 1.78 |
| 1925–26 | 2.61 | 2.48 | 1.49 | 1.70 | 1.75 | 1.66 |
| 1926–27 | 2.36 | 2.27 | 1.36 | 1.65 | 1.68 | 1.60 |
| 1927–28 | 2.34 | 2.20 | 1.32 | 1.54 | 1.60 | 1.53 |
| 1928–29 | 2.11 | 1.95 | 1.17 | 1.28 | 1.39 | 1.29 |
| 1929–30 | 2.12 | 1.93 | 1.16 | 1.31 | 1.36 | 1.23 |

Sources of data:

San Francisco: Records of the San Francisco Grain Trade Association.

Portland: Portland Oregonian and the Commercial Review, Portland, Oregon.

All others: Food Research Institute, Stanford University. Wheat Studies. (Except Australian at Liverpool, 1921-1922, from International Yearbook of Agricultural Statistics, converted at going rates of exchange.)

## TABLE 17

PRICES OF MILLING WHEAT AT SAN FRANCISCO AND PRICES OF CERTAIN DESIGNATED WHEATS AT EASTERN TERMINAL MARKETS, BY CROP YEARS,* 1921–1929, IN DOLLARS PER BUSHEL

| July-June | San Francisco milling† | Minneapolis No. 1 northern spring | Kansas City No. 2 hard winter | St. Louis No. 2 red winter | All classes and grades at six markets, weighted |
|---|---|---|---|---|---|
| 1921–22 | 1.22 | 1.47 | 1.20 | 1.29 | 1.24 |
| 1922–23 | 1.24 | 1.23 | 1.13 | 1.28 | 1.16 |
| 1923–24 | 1.12 | 1.19 | 1.07 | 1.11 | 1.07 |
| 1924–25 | 1.74 | 1.57 | 1.51 | 1.72 | 1.45 |
| 1925–26 | 1.57 | 1.61 | 1.63 | 1.71 | 1.55 |
| 1926–27 | 1.42 | 1.47 | 1.36 | 1.37 | 1.38 |
| 1927–28 | 1.40 | 1.40 | 1.38 | 1.58 | 1.33 |
| 1928–29 | 1.27 | 1.18 | 1.12 | 1.39 | 1.11 |
| 1929–30 | 1.27 | 1.24 | 1.14 | 1.26 | 1.16 |

*Average of daily prices weighted by reported cash sales. Simple average for 1929-30.
†Unweighted.

Sources of data:
San Francisco: Converted on basis of 60 pounds per bushel from table 16.
All others: 1921-1928: U. S. Dept. Agr. Yearbook of Agriculture **1930**:611-612. 1930.
1929-1930: U. S. Dept. Agr. Bur. Agr. Econ., Crops and Markets.

## TABLE 18

WHEAT EXPORTS BY MONTHS FROM PRINCIPAL EXPORTING COUNTRIES, AVERAGE 1924–1928, IN MILLIONS OF BUSHELS

| Months | Canada | United States | Argentina | Australia | Total |
|---|---|---|---|---|---|
| July | 20.5* | 10.5* | 7.5* | 5.1* | 43.6 |
| August | 16.9 | 21.7 | 6.0 | 4.1 | 48.7 |
| September | 18.9 | 28.1 | 5.1 | 3.2 | 55.3 |
| October | 34.6 | 28.5 | 6.3 | 2.8 | 72.2 |
| November | 51.9 | 19.4 | 5.7 | 2.6 | 79.6 |
| December | 49.3 | 12.8 | 8.3 | 4.6 | 75.0 |
| January | 17.2 | 9.3 | 16.8 | 14.8 | 58.1 |
| February | 16.3 | 6.9 | 23.2 | 14.7 | 61.1 |
| March | 20.6 | 9.1 | 23.5 | 14.0 | 67.2 |
| April | 12.0 | 9.8 | 19.6 | 11.5 | 52.9 |
| May | 27.4 | 11.6 | 14.8 | 10.6 | 64.4 |
| June | 23.8 | 9.4 | 13.5 | 9.0* | 55.7 |
| Total | 309.4 | 177.1 | 150.3 | 97.0 | 733.8 |

*Four-year average.

Source of data:
Compiled from Food Research Institute, Stanford University. Wheat Studies (annual review numbers).

## TABLE 19

WORLD WHEAT PRODUCTION BY PRINCIPAL WHEAT-PRODUCING COUNTRIES, 1909–1929, IN MILLIONS OF BUSHELS

| Year | United States | Canada | Argentina | Australia | Europe except Russia | Russia | World except Russia |
|---|---|---|---|---|---|---|---|
| 1909 | 700 | 167 | 131 | 90 | 1,240 | 846 | 2,819 |
| 1910 | 635 | 132 | 146 | 95 | 1,201 | 836 | 2,777 |
| 1911 | 621 | 231 | 166 | 72 | 1,347 | 563 | 3,043 |
| 1912 | 730 | 224 | 187 | 92 | 1,284 | 801 | 3,093 |
| 1913 | 763 | 232 | 105 | 103 | 1,301 | 1,028 | 3,098 |
| 1914 | 891 | 161 | 169 | 25 | 1,072 | 834 | 2,834 |
| 1915 | 1,026 | 394 | 169 | 179 | 1,125 | 827 | 3,497 |
| 1916 | 636 | 263 | 84 | 152 | 1,049 | 531 | 2,734 |
| 1917 | 637 | 234 | 235 | 115 | 740 | 622 | 2,574 |
| 1918 | 921 | 189 | 180 | 76 | 909 | ..... | 2,911 |
| 1919 | 968 | 193 | 217 | 46 | 899 | ..... | 2,821 |
| 1920 | 833 | 263 | 156 | 146 | 949 | 320 | 2,948 |
| 1921 | 815 | 301 | 191 | 129 | 1,216 | 205 | 3,169 |
| 1922 | 868 | 400 | 196 | 109 | 1,044 | 243 | 3,225 |
| 1923 | 797 | 474 | 248 | 125 | 1,257 | 419 | 3,551 |
| 1924 | 864 | 262 | 191 | 165 | 1,058 | 472 | 3,150 |
| 1925 | 676 | 395 | 191 | 115 | 1,397 | 757 | 3,441 |
| 1926 | 831 | 407 | 221 | 161 | 1,210 | 889 | 3,426 |
| 1927 | 878 | 480 | 239 | 118 | 1,268 | 752 | 3,661 |
| 1928 | 915 | 567 | 307 | 160 | 1,409 | 783 | 3,943 |
| 1929* | 807 | 294 | 143 | 112 | 1,415 | ..... | 3,415 |

*Subject to revision.

Source of data: U. S. Dept. Agr. Yearbook of Agriculture **1930**:604. 1930.

## TABLE 20

CARRYOVER OF WHEAT IN THE UNITED STATES, CANADA, ARGENTINA, AUSTRALIA, AND UNITED KINGDOM PORTS, 1922–1930, IN MILLIONS OF BUSHELS*

| Year | United States | Canada | Canadian in United States | Argentina | Australia | United Kingdom ports | Total |
|---|---|---|---|---|---|---|---|
| 1922 | 130 | 36 | ..... | 66 | 27 | ..... | 259 |
| 1923 | 153 | 29 | ..... | 56 | 42 | ..... | 280 |
| 1924 | 165 | 41 | 3 | 66 | 38 | 10 | 323 |
| 1925 | 135 | 26 | 3 | 56 | 36 | 9 | 265 |
| 1926 | 112 | 36 | 4 | 61 | 30 | 4 | 247 |
| 1927 | 137 | 51 | 5 | 65 | 34 | 8 | 300 |
| 1928 | 143 | 78 | 14 | 90 | 43 | 10 | 378 |
| 1929 | 264 | 104 | 23 | 130 | 36 | 6 | 563 |
| 1930 | 290 | 112 | 16 | 64 | 51 | 6 | 539 |

*August 1 except for United States, which is as of July 1.

Source of data:
Food Research Institute, Stanford University. Wheat Studies (annual review numbers).

TABLE 21

DISPOSITION OF WHEAT SUPPLY IN CALIFORNIA, AVERAGE 1926–1929

| | *1,000 bushels* | *Per cent* |
|---|---|---|
| Origin: | | |
| 1. California production | 13,570 | 46 |
| 2. Wheat brought in as grain | 5,125 | 17 |
| 3. Wheat brought in as flour | 11,090 | 37 |
| Total | 29,785 | 100 |
| Disposition: | | |
| 4. Wheat as flour— | | |
| a. Imported | 11,090 | 70 |
| b. Milled in California | 9,600 | |
| 5. Amount fed to livestock and wasted | 5,900 | 20 |
| 6. Amount used for seed | 1,085 | 4 |
| 7. Exports as grain | 470 | 1 |
| 8 Exports as flour | 1,640 | 5 |
| | 29,785 | 100 |

Sources of data:

1. 1926-1929 average from table 10.

2 and 3. Rail movement in from consolidated statement of common carriers in California; calendar-year averages, 1926-1929. Water movement in from Commercial Review; crop years, 1926-1929.

4. Milled in California. Crop-year averages, 1926-1929. 5 per cent has been added to allow for mills not reporting. U. S. Dept. Commerce.

5. Obtained by deducting all other disposition items from 29,785,000 which total was obtained by adding average California production to average annual quantity imported, 1926-1929. A considerable portion of the 5,900,000 bushels is fed to poultry. Enterprise efficiency studies as conducted by Mr. L. W. Fluharty of this division indicate that poultry is fed an average of 35 pounds of grain per hen per year and wheat constitutes 33 per cent of this or 12 pounds. 16,000,000 hens at 12 pounds per hen is equal to 3,200,000 bushels.

6. Weighted rate of seeding of 80 pounds per acre obtained from questionaires sent to farm advisors applied to acreage sown to wheat as reported by U. S. Dept. of Agriculture.

7 and 8. U. S. Dept. Commerce, Monthly Statements, San Francisco office.

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